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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/766,019	01/29/2004	Masaki Sugiyama	1448.1049	2669

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EXAMINER	
PENG, CHARLIE YU	
ART UNIT	**PAPER NUMBER**
2883	

DATE MAILED: 05/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/766,019	SUGIYAMA ET AL.	
	Examiner	Art Unit	
	Charlie Peng	2883	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12,14,15,18,19 and 21-24* is/are rejected.

7)☒ Claim(s) *3,13,16,17 and 20* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. 10/766,019.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *10/1/04, 01/29/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Brian Healy
Primary Examiner

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 3 is rejected under 35 U.S.C. 112, second paragraph, as being unclear on what is being claimed. "The curved ridge structure" **cannot** be formed outside itself.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States, or
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4, 6, 8, 9, 18, 19, and 21 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent 6,790,689 to Behfar. Behfar teaches an optical waveguide having a curved waveguide ridge segment **48**, two straight segments **44/46**, and an electrode **58** on a substrate **50**. The curved segment acts as an optical waveguide to guide light from one straight segment to the other (i.e. input to output). (See at least **Fig. 2** and its descriptions) A curved optical path is inherent to the curved waveguide

segment. Behfar further teaches a preferred fabrication process (**Fig. 7a**) during which a silicon dioxide layer (buffer layer) **316** is formed on the top side of an active waveguide **310**, which in turn is on top of a lower cladding **308** (ridge). (See at least **column 6, paragraph 3**) Behfar still further teaches he width of the cavity produced by this process is less than 1.0 micron, and preferably about 0.2 micron for single lateral mode operation. With specific reference to claim 3, insofar as the examiner can understand the claim, a curved ridge structure was formed. This limitation is fully met by Behfar. With specific reference to claim 19, Behfar teaches, in one embodiment illustrated in **Fig. 9**, a parallelogram setup of the straight waveguide segments connected to the curvature segments, therefore two sets of straight segments would be parallel to each other.

Claims 7, 10, and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 4,818,063 to Takizawa. Takizawa teaches a substrate having a curved waveguide (and path) **12** and a curved ridge structure **13A** that has a buffer layer with a low refractive index **16** covering one of its sides. (See at least **Figs. 6 & 11** and descriptions) Since the width of the ridge structure and the waveguide do not overlap, they have offset center lines. Takizawa further teaches in one embodiment, a waveguide having a width of 5 microns. (See at least **Fig. 3** and its descriptions) The method of manufacturing the same on an LNB substrate is described there.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Behfar. Behfar teaches the optical waveguide having the curved waveguide, ridge, and the buffer layer on an InP substrate. Behfar does not teach the substrate being made from lithium niobate (LNB). InP is a commonly used substrate for epitaxial growth, and LNB is a commonly used photorefractive material. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use lithium niobate as a substrate materials for Behfar's monolithic structure, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416. The motivation would be to take advantage of LNB's high photorefractive sensitivity and diffraction efficiency.

Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takizawa. Takizawa teaches the optical waveguide having the curved waveguide ridge and the buffer layer on a substrate except for the particular dimensions of the ridge (electrode **13A**). It would have been obvious to one having ordinary skill in the art at the time the invention was made to decide on the size based on the design of the rest of waveguide structure, since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the

level of ordinary skill in the art. In re Rose, 105 USPQ 237 (CCPA 1955). The motivation would be to select an electrode size that is large enough to adequately affect the refractive index of the waveguide, yet not too large to be wasteful or impact operations of rest of the waveguide structure.

Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Behfar in view of U.S. PGPub 2003/0128729 to Matsumura. Behfar teaches the curved optical waveguide segment **48** being connected to a straight segment **44/46** except for a coupling segment that connect the two segments having a width difference. Matsumura teaches that two ridge waveguide regions having different width are connected with a tapered waveguide region **C3/205**. (See at least **Fig. 15** and **[0114]**) It would have been obvious to one having ordinary skill in the art at the time the invention was made to connect the wider curvature segment to the narrower straight segment using a tapered segment. The motivation would be that a tapered waveguide segment minimizes optical losses in the junction. (Also see U.S. Patent 6,483,966 to Bona et al.)

Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takizawa. Takizawa teaches the optical waveguide having the curved waveguide ridge and the buffer layer on a substrate and the method of manufacturing is inherent to the structure except for substrate patterning. Takizawa does not teach patterning the LNB substrate using a method of proton exchange. Using proton exchange in benzoic acid melts to form waveguides is a method known in the art (e.g. U.S. Patents 4,827,866 and 6,511,571) and it would have been obvious to one having ordinary skill in the art at the time the invention was made to using this method in the instant application. The

motivation would be that it is an easy production process, can be used to achieve high refractive index variation, and usually generates smaller amount of cracks in the substrate.

Allowable Subject Matter

Claims 13, 17, and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Behfar and Takizawa teaches the optical waveguide structure with straight optical path segments except for a second ridge structure, a second buffer layer that cover a side of the second ridge structure, and a width change along the straight optical path or a shift in axis of the second ridge structure. It is the examiner's opinion that the prior art of record, taken alone or in combination, fails to disclose or render obvious in combination with the rest of the limitations of the base claim.

Claim 16 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Behfar and Matsumura teach the optical waveguide structure except for the straight segment being shifted off axis from the curvature segment. It is the examiner's opinion that the prior art of record, taken alone or in combination, fails to disclose or render obvious in combination with the rest of the limitations of the base claim.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charlie Peng whose telephone number is (571) 272-2177. The examiner can normally be reached on 9 am - 6 pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Brian Healy
Primary Examiner